

REMARKSAmendments

In the claims, claims 6 and 16, identified as allowable if rewritten in independent form, have been so rewritten, incorporating the subject matter of claims 1 and 11, respectively.

These amendments have been made solely to more clearly define and recite the present invention and in the interest of rapid prosecution and without prejudice to Applicants' right to prosecute claims of similar or different scope to the unamended claims in one or more continuation applications.

The Rejection Under 35 USC § 102(b)

Applicants respectfully traverse the rejection of claims 1, 2, 5, 9, 11, and 17 under 35 USC § 102(b) as anticipated by Wartenberg et al. (U.S. Patent No. 5,747,147), insofar as the rejection is applicable to the amended claims.

As discussed in the previous Reply, the present claims are directed to a surface mount circuit protection device in which a laminar PTC resistive element has a first electrode layer attached to a first surface. The first electrode layer is formed of a first metal material of a type adapted to be soldered to a printed circuit substrate. A second electrode layer is formed at a second major surface of the resistive element. Formed separately of the second electrode is a metal weld plate that has a thermal mass and thickness capable of withstanding resistance micro spot welding of a strap interconnect without significant resultant damage to the device. The ability to withstand damage is important, particularly when the PTC resistive element comprises a conductive polymer composition that would experience thermal damage as a result of the high temperatures associated with welding. The claimed device therefore can be soldered using one surface (i.e. the first electrode layer) and welded using the other surface (i.e. the metal weld plate on the second electrode layer). In a preferred use, the device is surface mounted to a printed circuit board assembly forming a battery protection circuit connected to a battery or battery cell by battery strap interconnects, wherein one of the battery strap interconnects is micro spot welded to the weld plate of the device.

Wartenberg et al. discloses a circuit protection device in which a conductive polymer is positioned between two metal foil electrodes. Wartenberg discloses that metal leads or thermal

control elements, e.g. metal terminals, can be attached either directly or by means of an intermediate layer, e.g. solder or conductive adhesive, to the foil electrodes (and not to a printed circuit board). There is in Wartenberg no teaching that a surface mount circuit protection device should or could have a first electrode layer that is solderable to a printed circuit board and a second electrode layer attached to a weld plate that is capable of withstanding resistance micro spot welding of a strap interconnect means without significant resultant damage to the device. Wartenberg merely teaches that metal leads or thermal control elements can be used. In fact, the detailed description of Examples 1 to 7 discloses attachment of tin-coated copper leads to each metal foil by means of solder (column 6, lines 49-53). There is no teaching of the use of Wartenberg's devices to achieve both solderability to a circuit board and weldability to a strap interconnect.

The Examiner has indicated that Column 5, lines 48-52 of Wartenberg teaches the presence of a metal material "having a volume, thickness and thermal mass capable of withstanding resistance micro spot welding of a strap interconnect [Col., [sic] 46-48] means without significant resultant damage to the device [Col. 6, lines 13-19, Figure]". In fact, there is no teaching or disclosure whatsoever of the use of resistance micro spot welding in Wartenberg (page 2, lines 15-18 of the Office Action). The Examiner further contends that Wartenberg teaches that the elements described by Wartenberg as being used to control the thermal output of the device "conform[s] to the weld plate of the Applicants claimed invention. This element to control the thermal output of Wartenberg's device has a thermal mass capable of withstanding resistance micro spot welding of a strap" (page 6, lines 13-17). Again, the Examiner's contention is not supported in Wartenberg, which does not teach the use of resistance micro welding, still less the advantages of being able to attach a single device to a circuit board by soldering, and to a strap interconnect by welding.

Concerning claim 10: The Examiner contends that Wartenberg discloses a printed circuit board assembly in which electrical connections are made by strap interconnects that are "micro spot welded to the weld plate means [Col. 5, lines 28-50]". Given that Wartenberg does not mention welding in any manner, such a contention is incorrect.

Concerning claim 18: There is no teaching or suggestion in Wartenberg of the specific assembly recited in claim 18 which comprises a lithium polymer cell having first and second terminal tabs wherein the first tab comprises strap interconnect means being micro spot welded to the weld plate or the second tab being connected to circuitry of the printed circuit substrate. Wartenberg does not teach anything about a lithium polymer cell having terminal tabs that are

connected in the way recited in the present claims; indeed Wartenberg does not disclose the use of his devices for battery protection, still less the use of micro welding.

The Rejection Under 35 USC § 103(a)

Applicants respectfully traverse the rejection of claims 3, 4, 7, 8, 10, 12-15, and 18-20 under 35 USC § 103(a) as unpatentable over Wartenberg et al. (U.S. Patent No. 5,747,147) in view of Banich et al. (U.S. Patent No. 6,104,587), insofar as the rejection is applicable to the amended claims.

Applicants believe that the deficiencies of Wartenberg noted above are not resolved by the addition of Banich et al. Banich discloses an electrical device in which a PTC resistive element composed of a conductive polymer composition is sandwiched between two metal foil electrodes, at least one of which has a thickness of at least 0.055 mm. The ratio of the thickness of the resistive element to the electrode thickness is 1:1 to 16:1. Like Wartenberg, Banich does not disclose a device in which there is a first electrode layer that is solderable to a printed circuit board and a second electrode layer attached to a weld plate that is capable of withstanding resistance micro spot welding.

Banich is cited for the proposition that the weld plate comprises nickel (claims 3, 4, 15, and 20), and the Examiner identifies element 75 as the weld plate. In fact, element 75 is the base layer of one of the electrodes (second electrode 7); see column 6, lines 46-55. It is an integral part of the electrode and is not separate from the electrode as would be required for the weld plate. As set forth in column 7, lines 20-29, the electrodes used in Examples 2 and 3 of Banich (which conform to the devices shown in Figure 2 with element 75) use a foil of the type disclosed in U.S. Application No. 08/816,471, having a base layer of a first metal, a surface layer of a second metal, e.g. nickel, and an intermediate layer that is different from the first metal (see column 5, lines 19-38). Thus element 75 is not, in fact, a weld plate or the equivalent of a weld plate.

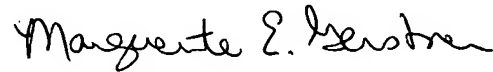
Banich provides preferred thickness dimensions for the at least one electrode (column 4, line 65 to column 5, line 7). However, in contrast to the Examiner's contention concerning claims 7, 8, 12, and 19, this at least one electrode is not the equivalent of Applicants' weld plate as it is not formed separately of and extending from the second electrode. A similar argument applies to the Examiner's comment concerning claims 13 and 14 which refer to the thicknesses

of the weld plate and the strap interconnect means. Since Banich does not provide a weld plate, there is no teaching or suggestion of preferred dimensions for such elements.

Conclusion

It is believed that this application is now in condition for allowance and such action at an early date is earnestly requested. If, however, there are any outstanding issues which can be usefully discussed by telephone, the Examiner is asked to call the undersigned.

Respectfully submitted,

A handwritten signature in cursive script, reading "Marguerite E. Gerstner".

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